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ABSTRACT

Relapses in alcoholics, smokers, and heroin users are frequently provoked by stress. Individuals often return to using addictive substances when feeling angry or frustrated as the result of negative mood states, interpersonal conflict, or social pressure. A behavioral weight-control program used to treat 140 overweight college students was evaluated during follow-up periods of 4-28 months to determine if emotional factors and external pressures were important in the failure of subjects to maintain weight losses. Most completers of the treatment program lost moderate amounts of weight which were, in many instances, not maintained after treatment termination. Analyses indicated that individuals with eating patterns related to negative emotional states and individuals who were married were most likely to gain weight in the follow-up period. Results suggest there is a need to investigate high-risk situations which provoke weight gain and to prepare program participants to cope with subsequent stressful episodes. (Author/HLM)

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# Relevance of Mood Eating Patterns to Maintenance of Weight Loss After Treatment

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Relevance of mood eating patterns to maintenance of weight loss after treatment

In the past 15 years, a large number of behavior modification techniques have been applied to weight control. Of these applications, the most encouraging results have been produced by "broad-spectrum" group treatments (as reviewed by Abramson, 1977; Leon, 1976; and Jeffrey, Wing, & Stunkard, 1978). In broad-spectrum groups, numerous techniques are presented, usually on a weekly basis, within the context of a supportive group framework. Such groups typically focus on diet, stimulus control, modification of cognitions, social skills, and control of eating provoked by negative emotional states. In general, broad-spectrum groups have been shown to produce one pound of weight loss for each week of the treatment period (Jeffrey, Wing, & Stunkard, 1978).

Although treatment effects for broad-spectrum groups are acceptable, a number of significant problems do exist in the research on these groups. Sample sizes are typically small, periods of follow-up of group members after treatment are frequently short (e.g., few longer than one year), and regaining of previously lost weight after treatment ends is characteristic of a high percentage of clients. In addition, there has been little systematic investigation of client characteristics which predict success or failure in maintaining weight losses after treatment has been terminated.

In the present study a long-term follow-up of 140 clients treated in a broad-spectrum behavioral weight-control program was conducted. Follow-up periods were from 4 to 28 months, depending on when the client participated in the program. Of the results of the investigation, this presentation will focus on the relationship between stress related eating patterns and the maintenance of weight losses after treatment has been terminated.

Recent research by Marlatt and his associates (Marlatt & Gordon, 1979; Marlatt & Marques, 1977) indicated that relapse in alcoholics, smokers, and heroin users was frequently provoked by stress. Their subjects typically returned to using the addictive substance when feeling angry or frustrated as the result of negative mood states, interpersonal conclict, or social pressure. Marlatt's research suggests that emotional factors and external pressures may be important in the failure of individuals to maintain weight losses. On the basis of Marlatt's research and on our clinical impressions from conducting the treatment program, a number of hypotheses were developed. The following variables were expected to predict regaining of weight during the follow-up period:

(1) Overeating during negative mood states during the baseline week of record keeping.

(2) High total score on the SCL-90, which is a self-report scale assessing 10 areas of psychopathology.

(3) Scoring high on the depression, anxiety, and anger scales of the SCL-90.

(4) Scoring high on the "Binge Questionnaire", which assesses tendencies for compulsive overeating provoked by negative emotional states.

In addition to the above variables, the effects of four demographic characteristics were assessed: sex, age, marital status, and parental status (i.e., whether the client had children or not). No hypotheses were developed concerning these variables.

## Method

### Subjects-

One hundred forty undergraduate and graduate students at the University of Texas at Austin participated in 1 of 12 broad-spectrum behavioral groups conducted at the University Student Health Center. Clients were primarily self-referred in response to notices in the University student newspaper.

All therapy groups were relatively homogeneous in terms of mean pretreatment weight and sex ratio. The original 140 subjects included 121 females and 19 males. The females were 44.5 percent overweight on the average before treatment and the males were 57.7 percent overweight on the average.

### Therapists-

One Ph.D. level clinical psychologist (the second author of the present paper) was the group leader for all 12 therapy groups. In all but two groups co-therapists were used. Co-therapists were mental health professionals or graduate students in psychology.

### Instruments-

A number of instruments were used as predictor variables. The application form was the source of information for the variables sex, age, marital status, and parental status. Two self-report questionnaires, which clients completed between the first and second weeks of treatment, were also used. The Binge Questionnaire is a scale developed by Hawkins and Clement (in press) which was used as an indicator of compulsive emotional eating tendencies. The SCL-90 (Derogatis, Lipman, & Covi, 1973)

was used to assess psychopathology. The client indicated to what degree he or she had been troubled by 90 different problems in the month previous to the time of completing the questionnaire. Ten individual scale scores and a total score were produced by the SCL-90. The percentage of ingestions during negative moods (i.e., tense, depressed, angry, bored, fatigued, or rushed) was obtained from the client's daily food intake records during the baseline week. Clients had been asked not to make any changes in their eating behaviors during this initial week of record keeping.

For the follow-up portion of the study, an additional self-report questionnaire was used. This questionnaire was mailed to all former clients and it assessed follow-up weight and other information about the client's eating habits since completing treatment.

Treatment procedure-

During the treatment program, 9 to 17 clients met with group leaders for 1.5 hours each week. Initially, clients were weighed and given written feedback from the group leaders regarding their food records from the previous week. A general group discussion was then conducted followed by the presentation of the lesson for that week by the group leaders.

The format for the group was to meet for 12 weeks, but this was altered for some groups. The groups met for a range of 9 to 13 weeks. Treatment sessions covered the following sessions in the following order: (1) self-monitoring; (2) modifying cognitions; (3) slowing the rate of eating and use of the food exchange program (which included caloric reduction and goal setting); (4) increasing enjoyable exercise; (5) decreasing external stimulus control; (6) planning regular times for meals and snacks; (7) generating social support; (8) assertion training; (9) coping with eating which is provoked by negative emotional states; (10) coping with periods of uncontrollable binge eating behavior; (11) techniques to increase enjoyment of eating small amounts of food; and (12) explanation of the follow-up procedure (Hawkins, Setty, & Baldwin, 1977).

Follow-up procedure

During the follow-up, attempts were made to contact all 140 clients who participated in the program. Initially they were mailed the follow-up questionnaire. After three weeks, clients who had not responded were contacted by phone and asked to commit themselves to completing the questionnaire or to indicate that they had decided not to do so.

Follow-up questionnaires were received from 80 subjects. Data from previous correspondence with 7 additional subjects was available. Thus, usable follow-up data were obtained from a total of 87 subjects. Of the 60 subjects who did not complete the present follow-up survey, 52 could not be located. Analyses indicated that follow-up responders did not differ from non-responders in pretreatment demographic or weight characteristics.

## Results

To aid comparison with other studies, weight loss data was coded in three ways: as pounds lost, percentage of body weight lost, and as the "Weight Reduction Index (WRI)." The WRI measures the amount of weight loss relative to the amount needed to obtain an ideal target weight. The formula for computing the WRI is:

$$WRI = \frac{\text{pounds lost}}{\text{pounds overweight}} \times \frac{\text{initial weight}}{\text{ideal weight}} \times 100.$$

The index was offered by Wilson (1978) as a mechanism by which standardized data can be presented throughout obesity research.

### Treatment effects-

Eighty-one of 140 subjects (58%) completed treatment. Subjects who completed treatment lost a mean of 8.7 pounds which was 5% of their pretreatment body weight. Their mean WRI was -26.1. These data are presented in Table 1 on page 5. T-tests indicated that the treatment weight losses of completers were significantly greater than those of drop-outs, considering all three weight loss criteria.

### Follow-up effects-

Of the 81 completers of treatment, 57 completed follow-up data. Thirty-three completers (58%) increased their weight losses during follow-up while 24 (42%) gained weight. Eleven clients (18%) regained weight to a level equal to or above their pretreatment weight.

It is notable that of 30 drop-outs who completed follow-up data, 19 (63%) weighed less than when they had terminated treatment. T-tests indicated that drop-outs who lost a mean of 7.2 pounds, lost significantly more weight during follow-up than did completers who lost .6 pounds.

TABLE 1

WEIGHT CHANGE AFTER TREATMENT, DURING FOLLOW-UP,

AND OVERALL FOR COMPLETERS AND DROP-OUTS

| | pounds lost | | | | | | percentage lost | | | | | | weight reduction index | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | treatment | | follow-up | | overall | | treatment | | follow-up | | overall | | treatment | | follow-up | | overall | |
| | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. |
| completers | 8.7 | 7.6 | .6 | 12.1 | 10.3 | 15.3 | 5.0 | 3.8 | 0.0 | 0.7 | 5.6 | 7.8 | -26.1 | 20.4 | 4.8 | 59.8 | -28.3 | 41.1 |
| drop-outs | 2.0 | 3.9 | 7.2 | 19.3 | 8.7 | 3.5 | 1.3 | 2.3 | 3.8 | 1.0 | 4.7 | 9.7 | -7.3 | 12.9 | -20.0 | 46.4 | -24.3 | 46.7 |

Analyses of predictor variables-

It was expected that percentage of baseline ingestions during negative mood states would predict regaining of weight during the follow-up period. As indicated by Table 2 on page 7, this variable was found to be significantly correlated with all weight loss criteria beyond the .01 level of significance. As percentage of ingestions during negative moods rose, clients tended to gain weight.

As expected, scoring high on the SCL-90 anger scale predicted gaining of weight during follow-up. All correlations were statistically significant both for analyses involving all subjects and for those involving the completers of treatment only.

Contrary to initial hypotheses, the SCL-90 total score, the depression scale, the anxiety scale, and the Binge Questionnaire were not significantly correlated with any weight loss criteria. However, clients with high scores on the Binge Questionnaire were more likely to drop-out of treatment than clients with low scores ($t = -2.36$, $df = 109$, $p < .05$).

Concerning the variables for which no hypotheses had been offered, client's sex was not significantly related to any of the weight loss criteria. As shown in Table 2, age was significantly correlated with all weight-loss criteria beyond the .05 level. Older clients tended to gain weight during follow-up. T-tests indicated that marital status was significantly related to follow-up pounds lost ($t = -3.51$, $df = 48$, $p < .001$), percentage of body weight lost ($t = -3.36$, $df = 48$, $p < .01$), and WRI ($t = -2.77$, $df = 48$, $p < .01$). Married clients gained a mean of 8.8 pounds during follow-up while single clients (i.e., never married, widowed, divorced, or separated) lost a mean of 4.4 pounds. T-tests also indicated that patental status was significantly related to all weight-loss criteria beyond the .05 level of significance.

Multiple regression analyses-

In order to further examine the relationships between follow-up weight change and predictor variables, stepwise multiple regression analyses (Nie et al., 1975) were conducted. Although individual predictor variables were shown to account for statistically significant proportions of the variance in follow-up weight loss, the overall predictive power of the variables combined should be determined in order to assess clinical utility.

TABLE 2

CORRELATIONS BETWEEN THREE VARIABLES AND FOLLOW-UP CRITERIA FOR ALL SUBJECTS AND FOR COMPLETERS ONLY

| | ALL SUBJECTS | | | | COMPLETERS ONLY | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | n | Weight Change (lbs.) | Percentage Change | WRI | n | Weight Change (lbs.) | Percentage Change | WRI |
| age | 81 | .24* | .30** | .31** | 54 | .37** | .38** | .36** |
| SCL-90 anger | 61 | .25* | .24* | .23* | 44 | .37** | .39** | .35* |
| Ingestions during negative moods | 65 | .33** | .31** | .30** | 49 | .48** | .47** | .40** |

* $p < .05$
** $p < .01$

Note: The positive correlations indicate that as the value of the variable increased, the subjects were less successful in losing weight. (2-tailed tests of significance were used for the variable "age").

Table 3 on page 9 provides descriptive statistics for the regression of three weight loss criteria during follow-up (i.e., pounds lost, percentage of body weight lost, and WRI) on the predictor variables ingestions during negative moods, the SCL-90 anger scale, age of the client, and parental status. The $\underline{R}^2$ value for this regression varied between .25 and .32 for the three criteria, adjusted for sample size and number of predictors. Examination of the standardized "beta" weights in Table 3 indicate that the first three variables accounted for significant variance in the criteria, while the predictor "parental status" did not. Interpretations of these regression analyses should be qualified with the fact that there were differences in the amount of weight lost related to marital status, although not to client's sex. Married clients were significantly older and had significantly more children than single clients. Thus, the variance in follow-up weight-loss explainable by client's age and parental status can be summarized by the marital status effect. Married clients also tended to report more anger on the SCL-90 anger scale ($\underline{p} < .15$), but did not report more negative moods associated with ingestions.

## Discussion

The results of the present study were similar to those of nearly every behavioral weight control program. Most completers of treatment lost moderate amounts of weight which were, in many instances, not maintained once treatment was terminated. What distinguishes this study from others with similar results is that we have identified subjects who were and were not successful in maintaining their weight losses. Analyses indicated that individuals with eating patterns related to negative emotional states and individuals who were married were most likely to gain weight during the follow-up period. This indicates that the program failed to provide "emotional" eaters with alternate coping mechanisms that were powerful enough to be effective in high-risk situations after treatment. The fact that binge eaters dropped out of treatment suggests that these individuals in particular became discouraged about treatment not addressing their problems.

It is unclear why married individuals did poorly. In addition to living with a spouse, these clients frequently had children. Preparing food for their family or keeping highly caloric foods in the household for their spouse or children may have created high-risk situations for these individuals. Such problems were frequently mentioned by married clients during treatment meetings. Although no conclusion can be drawn concerning the reason marital status predicted weight

TABLE 3

REGRESSION ANALYSES

Dependent variable = pounds lost

| Step | Variable entered | F to enter | sign. | Mult. R | $R^2$ | $R^2$ change | Beta | Overall |
|---|---|---|---|---|---|---|---|---|
| 1 | age | 9.74451 | .003 | .40728 | .16588 | .16588 | .37 | 9.74453 |
| 2 | negative moods | 7.45361 | .009 | .52745 | .27800 | .11212 | .32 | 9.24077 |
| 3 | anger scale | 6.37626 | .015 | .60353 | .36424 | .08625 | .27 | 8.97595 |
| 4 | parental status | .31762 | .576 | .60713 | .36860 | .00436 | .08 | 6.71363 |

Ajusted R value = .32

Dependent variable = percentage of body weight lost

| Step | Variable entered | F to enter | sign. | Mult. R | $R^2$ | $R^2$ change | Peta | Overall |
|---|---|---|---|---|---|---|---|---|
| 1 | age | 10.67603 | .002 | .42257 | .17890 | .17890 | .43 | 10.67603 |
| 2 | anger scale | 6.78446 | .012 | .52970 | .28058 | .10168 | .29 | 9.36040 |
| 3 | negative moods | 5.62172 | .022 | .59786 | .35744 | .07686 | .28 | 8.71502 |

Adjusted R value = .32

Dependent variable = weight reduction index

| Step | Variable entered | F to enter | sign. | Mult. R | $R^2$ | $R^2$ change | Beta | Overall |
|---|---|---|---|---|---|---|---|---|
| 1 | age | 6.96547 | .011 | .35279 | .12446 | .12446 | .44 | 6.96547 |
| 2 | negative moods | 6.03877 | .018 | .47149 | .22230 | .09784 | .26 | 6.86026 |
| 3 | anger scale | 5.01682 | .030 | .54526 | .29731 | .07501 | .31 | 6.62851 |
| 4 | parental status | .80920 | .373 | .55629 | .30945 | .01215 | .14 | 5.15350 |

Adjusted R value = .25

gaining, it can be stated simply that clients facing situational demands related to their family did not have sufficient coping resources once the assistance in problem-solving and support of the treatment group were terminated.

The obesity research literature has produced no systematic attempts to identify variables predictive of follow-up maintenance. Specific high-risk situations for subjects who have regained weight during follow-up have never been investigated. Nonetheless, as previously mentioned, the research of Marlatt and his associates (Marlatt & Gordon, 1979; Marlatt & Marques, 1977) indicated that anger or frustration typically provoked relapse in alcoholics, smokers, and heroin users. The anger usually arose from a negative mood state, from social pressure, or from interpersonal conflicts. The present study indicated that tendencies to overeat in response to negative emotions and interpersonal factors (i.e., marital/family issues) were related to individuals returning to previous eating habits. The similarity between the present results and Marlatt's work suggests that a common cognitive mechanism may be involved.

Marlatt and Gordon (1979) postulate that typically the urge to seek the addictive substance will be provoked by anger or frustration. If the client copes adaptively with the high-risk situation, his or her perception of control over such problems will increase and the individual will be less likely to rely on the addictive substance. If the individual fails to respond to frustration or anger with a successful coping response, a decreased sense of control will be produced. This may combine with positive expectations about the effects of the addictive substance to bring about a relapse. Certainly many overweight individuals believe that eating results in anxiety-reduction and comfort. As guilt arises from "failing" and overeating, one's sense of control is again reduced and the probability of relying on food is further increased. Ultimately, for some individuals, giving up and saying "I'll never stop overeating so I shouldn't even try" will reduce guilt reactions to overeating, but this rationalization of course fosters continued relapse and weight gain.

A number of implications arise for future research and treatment of obesity based on Marlatt's research and the results of the present study:

(1) The specific high-risk situations which provoke return to previous eating patterns and regaining of weight during follow-up periods should be investigated.

(2) Problem-solving skills should be integrated throughout group treatment programs.

(3) Individual sessions to integrate the effects of the treatment program and to individualize preparation for high-risk situations after treatment should be considered as additions to group treatment programs.

(4) Continued contact with therapists for consultation and treatment materials such as food records should be available to clients after treatment has terminated.

(5) Group treatment programs should be developed which are designed to treat clients with specific types of problems (e.g., "emotional" eaters).

The present study indicates the importance of examining individual differences characteristics predictive of successful outcome in a broad-spectrum weight-control program. We suggest that researchers continue attempting to identify how specific client groups respond to clearly defined treatment modalities.

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